WHAT IS CLAIMED IS:

1. A method for causing motion of particles in a medium, the method comprising:

applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

wherein the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period.

2. A method according to claim 1 wherein the driving field applies a periodically varying driving force to the particles.

3. A method according to claim 2 wherein the driving force averages to zero over an integral number of cycles of the driving field.

4. A method according to claim 2 or 3 wherein the mobility-varying field causes the mobility of the particles to vary periodically.

5. A method according to claim 4 wherein the driving force and the varying mobility of the particles have a substantially constant phase relationship.

6. A method according to any one of claims 1 to 5 wherein applying the driving field to the particles in the absence of the mobility-varying field results in no net motion of the particles.

7. A method according to any one of claims 1 to 6 wherein applying the mobility-varying field to the particles in the absence of the driving field results in no net motion of the particles.

8. A method according to any one of claims 1 to 5 wherein the particles have a velocity, v, resulting from the application of the driving field and the mobility-varying field together and v differs from the sum of the particle velocities that would result from the application of the driving field and the mobility-varying field independently.

9. A method according to any one of claims 1 to 7 wherein the correlation is non-zero when computed according to:

$$C_{f(t),g(t)} = \int_T f(t)g(t+\lambda)dt$$

where $f(t)$ is the variation in driving force with time, $g(t)$ is the variation in the mobility of the particles with time and λ is a constant time shift, for some value of λ and T is the period.

10. A method according to claim 2 or 3 wherein the driving force varies sinusoidally in time.

11. A method according to any one of claims 1 to 10 wherein the driving field and mobility-varying fields are both of the same type.

12. A method according to any one of claims 1 to 10 wherein the driving field and mobility-varying fields are of different types.

13. A method according to claim 11 or 12 wherein the driving field comprises a time-varying electric field.

14. A method according to claim 13 wherein the particles comprise electrically charged molecules.

15. A method according to claim 13 wherein each of the particles comprises an electrically neutral particle bonded to an electrically charged particle.

16. A method according to claim 13 wherein the particles have dielectric constants different from that of the medium and the electric field has a time-varying gradient.

17. A method according to claim 11 or 12 wherein the driving field comprises a time-varying magnetic field.

18. A method according to claim 17 wherein the particles comprise ferromagnetic material.

19. A method according to claim 18 wherein the particle comprises a ferromagnetic bead attached to a molecule.

20. A method according to claim 18 wherein the particles have magnetic susceptibilities different from that of the medium and the magnetic field has a time-varying gradient.

21. A method according to claim 11 wherein the driving field comprises a time-varying flow in the medium.

22. A method according to claim 11 wherein the driving field comprises a time-varying density gradient of some species in the medium.

23. A method according to claim 11 or 12 wherein the driving field comprises a time-varying gravitational or acceleration field.

24. A method according to claim 23 comprising accelerating the medium and periodically changing an orientation of the medium relative to a direction of the acceleration.

25. A method according to claim 11 or 12 wherein the driving field comprises an acoustic field.

26. A method according to claim 12 wherein the particles comprise living organisms.

27. A method according to claim 1 wherein the driving field comprises an alternating electric field aligned in a first direction.

28. A method according to claim 27 wherein the velocity of the particles is a non-linear function of applied electric field and the mobility-varying field comprises an electric field having an alternating component transverse to the first direction.

29. A method according to claim 27 or 28 wherein the force applied by the driving field varies with a first frequency; the mobility-varying field varies in time with a second frequency; and the first frequency is twice the second frequency.

30. A method according to any one of claims 1 to 29 wherein applying the mobility-varying field causes changes in a conformation of the particles.

31. A method according to any one of claims 1 to 29 wherein applying the mobility-varying field causes changes in a viscosity of the medium.

32. A method according to any one of claims 12 to 26 wherein applying the mobility-varying field comprises changing a temperature of the medium.

33. A method according to any one of claims 12 to 26 wherein applying the mobility-varying field comprises exposing the particles to electromagnetic radiation wherein one or more of an intensity, polarization or wavelength of the radiation varies in time with the driving field.

34. A method according to any one of claims 11 to 26 wherein applying the mobility-varying field comprises applying an electric field to at least the portion of the medium through which the particles are passing.

35. A method according to any one of claims 11 to 26 wherein applying the mobility-varying field comprises applying a magnetic field to the medium through which the particles are passing.

36. A method according to claim 35 wherein the particles comprise magnetic dipoles and applying the magnetic field causes an orientation of the magnetic dipoles to change in time relative to a direction of the driving force.

37. A method according to claim 35 wherein the medium comprises a magnetorheological fluid and applying the magnetic field causes a change in viscosity of the magnetorheological fluid.

38. A method according to any one of claims 12 to 26 comprising causing particles to travel in the medium along a surface wherein applying the mobility-varying force alters an interaction between the particles and the surface.

39. A method according to any one of claims 12 to 26 wherein applying the mobility-varying field comprises applying an acoustic signal to the medium.

40. A method according to any one of claims 12 to 26 wherein applying the mobility-varying field comprises causing a cyclic change in concentration of a species in the medium.

41. A method according to any one of claims 12 to 26 wherein applying the mobility-varying field comprises applying an electroosmotic effect.

42. A method according to any one of claims 12 to 26 wherein applying the mobility-varying field comprises causing cyclic chemical changes in the medium.

43. A method according to any one of claims 12 to 26 wherein applying the mobility-varying field comprises causing the particles to cyclically bind and unbind to other particles in the medium.

44. A method according to any one of claims 12 to 26 wherein applying the mobility-varying field comprises causing the particles to cyclically bind and unbind to a component of the medium.

45. A method according to any one of claims 12 to 26 wherein applying the mobility-varying field comprises varying a hydrostatic pressure experienced by the medium.

46. A method according to any one of claims 12 to 26 comprising allowing the particles to pass through an area of the medium having a physical dimension on the order of a dimension of the particles wherein applying the mobility-varying field comprises varying the physical dimensions of the area of the medium to cause a change in an effective drag experienced by the particles in the area of the medium.

47. A method according to claim 32 wherein applying the mobility-varying field comprises directing radiation at at least a portion of the medium and allowing the radiation to be absorbed in the medium.

48. A method according to claim 32 wherein applying the mobility-varying field comprises operating one or more heaters or coolers in thermal contact with the medium.

49. A method according to claim 32 wherein applying the mobility-varying field comprises causing endothermic or exothermic chemical reactions to occur in the medium or in a location that is in thermal contact with the medium.

50. A method according to claim 32 wherein the particles have an electromagnetic absorption band and wherein applying the mobility-varying field comprises directing radiation having a wavelength in the electromagnetic absorption band at the particles.

51. A method according to claim 33 wherein the particles comprise a component that undergoes a reversible change in conformation in response to the radiation.

52. A method according to claim 33 wherein the particles comprise DNA bonded to molecules that undergoes a reversible change in conformation in response to the radiation.

53. A method according to claim 33 wherein the particles comprise azobenzene molecules.

54. A method according to claim 33 wherein the particles comprise spiro-pyrans molecules.

55. A method according to claim 33 wherein applying the electromagnetic radiation causes partial cross-linking of polymers in the medium.

56. A method according to claim 33 wherein the radiation directly affects the mobility of the particles in the medium.

57. A method according to claim 33 wherein at least a portion of the radiation is absorbed by the particles and released as heat to the medium in the immediate vicinity of the particles whereby a viscosity of only a portion of the medium in the immediate vicinity of the particles is altered by the release of heat from the particles.

58. A method according to claim 39 comprising generating standing acoustic waves in the medium.

59. A method according to claim 42 wherein the chemical changes alter a conformation of the particles.

60. A method according to claim 42 wherein the chemical changes alter a conformation of a species in the medium other than the particles.

61. A method according to claim 42 wherein the chemical changes alter binding of the particles to one another.

62. A method according to claim 42 wherein the chemical changes alter binding of the particles to other species or structures in the medium.

63. A method according to claim 42 wherein the chemical changes alter binding of species in the medium to one another.

64. A method according to claim 42 wherein the chemical changes alter a viscosity of the medium.

65. A method according to claim 42 comprising causing the chemical changes by applying optical radiation to the medium.

66. A method according to claim 63 comprising optically inducing oxidation or reduction of photoactive molecules in the medium.

67. A method according to claim 65 wherein the photoactive molecules comprise ferrocene.

68. A method according to claim 42 comprising inducing the chemical changes by introducing chemical species into the medium.

69. A method according to claim 42 wherein the chemical changes alter a pH of the medium.

70. A method according to claim 35 wherein the medium comprises ferromagnetic particles and applying the magnetic field causes the feromagnetic particles to be pulled away or into a path of the particles.

71. A method according to claim 35 wherein applying the magnetic field comprises causing a viscosity of the medium to vary in a two-dimensional pattern.

72. A method according to claim 71 wherein the medium comprises magnetic particles wherein applying the magnetic field causes the magnetic particles of the medium to aggregate with one another.

73. A method according to claim 35 wherein applying the magnetic field causes the particles to be drawn toward or moved away from a drag-inducing surface.

74. A method according to claim 27 wherein the mobility-varying field comprises an electric field having an alternating component transverse to the first direction.

75. A method according to claim 74 wherein applying the electric mobility-varying field causes the particles to be drawn toward or moved away from a drag-inducing surface.

76. A method according to claim 35 wherein applying the magnetic field causes the particles to aggregate.

77. A method according to any of claims 1 to 76 wherein the particles comprise biomacromolecules.

78. A method according to claim 77 wherein the biomacromolecules are electrically charged.

79. A method according to claim 77 wherein the biomacromolecules are electrically neutral.

80. A method according to any one of claims 77 to 79 wherein the biomacromolecules comprise proteins.

81. A method according to any one of claims 77 to 79 wherein the biomacromolecules comprise RNA.

82. A method according to any one of claims 77 to 79 wherein the biomacromolecules comprise DNA.

83. A method according to any one of claims 77 to 79 wherein the biomacromolecules comprise lipids.

84. A method according to any one of claims 77 to 79 wherein the biomacromolecules comprise polymers.

85. A method according to any one of claims 77 to 79 wherein the biomacromolecules comprise polypeptides.

86. A method according to any one of claims 1 to 76 wherein the particles comprise aggregations of molecules.

87. A method according to claim 86 wherein the aggregations comprise micelles.

88. A method according to any one of claims 1 to 87 wherein the medium comprises a gel.

89. A method according to claim 88 wherein the gel comprises an agarose gel.

90. A method according to any one of claims 1 to 87 wherein the medium comprises a liquid solution of polymers.

91. A method according to any one of claims 1 to 87 wherein the medium comprises binding sites designed to bind to the particles.

92. A method according to any one of claims 1 to 87 wherein the medium comprises acrylamide or poly-acrylamide.

93. A method according to any one of claims 1 to 87 wherein the medium comprises a microfabricated array of posts.

94. A method according to any one of claims 1 to 87 comprising allowing the particles to interact with the medium by entropic trapping.

95. A method according to any one of claims 1 to 94 wherein the particles are substantially constrained to move on a 2D surface.

96. A method according to claim 95 wherein the 2D surface comprises a thin layer of the medium.

97. A method according to any one of claims 1 to 95 wherein the medium has a three dimensional extent and the method comprises concentrating the particles at a location in the medium by periodically changing a plane of the driving force.

98. A method according to any one of claims 1 to 97 wherein the medium comprises a first part and a second part, and the method comprises applying a first mobility-varying field in the first part and a second mobility-varying field in the second part, wherein the driving field and the first mobility-varying field cause particles in the first part to move toward the second part and wherein the driving field and second mobility-varying field cause particles in the second part to move toward the first part.

99. A method according to claim 1 wherein applying the driving field and applying the mobility-varying field comprise applying two independent time-varying electric fields to the medium containing the particles.

100. A method according to claim 99 wherein, at the particles, the two independent electric fields are not aligned with one another during at least a portion of the period.

101. A method according to any one of claims 99 to 100 wherein the first electric field approximates a dipole field within an area of the medium.

102. A method according to any one of claims 99 to 101 wherein the second electric field approximates a quadrupole field in the area of the medium.

103. A method according to any one of claims 99 to 102 wherein the time variation of the first electric field constitutes a rotation of the first electric field about a location in the area of the medium.

104. A method according to any one of claims 99 to 103 wherein the time variation of the second electric field constitutes a rotation of the second electric field about a location in the area of the medium.

105. A method according to any one of claims 99 to 102 wherein the time variation of the first electric field constitutes a rotation of the first electric field about a location in the area of the medium at a first angular frequency and the time variation of the second electric field constitutes a rotation of the second electric field about a location in the area of the medium at a second angular frequency, wherein the second angular frequency is twice the first angular frequency.

106. A method according to any one of claims 1 to 105 wherein the medium constitutes a first medium and the method comprises subsequently extracting the particles from the first medium by an extraction method comprising:

providing a second medium adjoining the first medium at an interface wherein, in the second medium, the particles have velocities that vary substantially linearly with an intensity of an extraction driving field;

for a plurality of extraction periods, in alternation:

for a first part of an extraction period, applying a first extraction driving field directed across the interface, the first extraction

driving field causing the particles in the first medium to move toward the interface by a first distance during the first part of the extraction period;.

for a second part of the extraction period, applying a second extraction driving field across the interface, the second extraction driving field having an intensity different from the first extraction driving field and causing the particles in the first medium to move away from the interface by a second distance less than the first distance during the second part of the extraction period;

allowing the particles to cross the interface into the second medium.

107. A method according to claim 106 comprising allowing the particles to become concentrated in the second medium.

108. A method according to cone of claims 106 and 107 wherein the second medium comprises a buffer solution.

109. A method according to one of claims 106 to 108 comprising sucking the second medium containing the particles into a transfer device.

110. A method according to any one of claims 1 to 105 wherein the medium constitutes a first medium and the method comprises subsequently extracting the particles from the first medium into a second medium by an extraction method comprising:

during an extraction period applying a time-varying extraction driving field and a time-varying extraction mobility-varying field to the particles, the extraction driving field applying a time-varying extraction driving force to the particles the extraction driving force alternating in direction and directed across the interface;

the extraction mobility-varying field causing a mobility of the particles in the first medium to vary during the period, in a manner having a non-zero

correlation with the driving field over the period such that particles in the first medium drift toward the interface with a first net velocity until the particles enter the second medium.

111. A method according to claim 110 comprising applying the extraction mobility-varying field only to the first medium so that the particles have a net drift velocity in the second medium that is significantly less than the first drift velocity or zero.

112. A method according to claim 110 wherein the extraction mobility-varying field does not significantly affect the mobility of the particles in the second medium.

113. A method for extracting particles from a first medium wherein the particles have a mobility that varies with an intensity of a driving field, the method comprising:

providing a second medium adjoining the first medium at an interface;

applying an asymmetric time-varying extraction driving field having a component directed across the interface, the extraction driving field causing the particles in the first medium to have a first net drift velocity toward the interface;

allowing the particles to drift across the interface into the second medium;

wherein, under the influence of the extraction driving field, the particles in the second medium either:

have a net drift velocity away from the interface that is significantly smaller than the first net drift velocity; or,

have a net drift velocity that is substantially zero; or,

have a net drift velocity directed toward the interface.

114. A method according to claim 113 wherein the particles are charged and the extraction driving field comprises an alternating electric field.

115. A method according to claim 114 wherein a time integral over one cycle of the alternating electric field is substantially zero.

116. A method according to claim 114 wherein the alternating electric field has a DC bias in a direction that tends to move those of the particles in the second medium toward the interface.

117. A method according to any one of claims 113 to 117 wherein the second medium comprises a buffer.

118. A method according to any one of claims 113 to 118 wherein the first medium comprises a gel.

119. A method according to claim 118 wherein the gel comprises an agarose gel.

120. A method according to any one of claims 113 to 119 wherein the particles have a mobility in the first medium that is dependent on an intensity of the extraction driving field.

121. A method according to any one of claims 113 to 120 wherein the particles have a mobility in the second medium that is not dependent upon the intensity of the extraction driving field.

122. A method according to any one of claims 113 to 122 wherein the particles constitute first particles and second particles are present in the first medium wherein, under the influence of the extraction driving field, the second particles in the first medium have a net drift velocity that is at least one of:

zero; and,

significantly smaller than the first net drift velocity.

123. A method for extracting charged particles from a first medium, the method comprising:

providing a second medium adjoining the first medium at an interface;

applying an alternating, asymmetrical, zero integrated field electrophoresis field directed across the interface; and,

allowing particles to drift from the first medium to the interface with a first net drift velocity under the influence of the zero integrated field electrophoresis field;

allowing the particles to enter the second medium and to become concentrated in the second medium near the interface.

124. A method according to claim 123 wherein a time integral over one cycle of the zero integrated field electrophoresis field is substantially zero.

125. A method according to claim 123 comprising a DC electrical bias field directed so as to tend to move those of the particles in the second medium toward the interface.

126. A method according to any one of claims 123 to 125 wherein the second medium comprises a buffer.

127. A method according to any one of claims 123 to 126 wherein the first medium comprises a gel.

128. A method according to claim 127 wherein the gel comprises an agarose gel.

129. A method according to any one of claims 123 to 128 wherein the particles have a mobility in the first medium that is dependent on electric field intensity.

130. A method according to any one of claims 123 to 129 wherein the particles have a mobility in the second medium that is substantially independent of an intensity of the zero integrated field electrophoresis field.

131. A method according to any one of claims 123 to 130 wherein the particles constitute first particles and second particles are present in the first medium wherein, under the influence of the zero integrated field electrophoresis field, the second particles in the first medium have a net drift velocity toward the interface that is at least one of:

zero; and,

significantly smaller than the first net drift velocity.

132. A method according to any one of claims 113 to 131 wherein the particles comprise DNA.

133. A method according to any one of claims 113 to 131 wherein the particles comprise biomacromolecules.

134. A method according to any one of claims 113 to 131 wherein the particles comprise proteins.

135. A method according to any one of claims 113 to 131 wherein the particles comprise RNA.

136. A method according to any one of claims 113 to 131 wherein the particles comprise lipid molecules.

137. A method according to any one of claims 113 to 131 wherein the particles comprise polymers.

138. A method according to any one of claims 113 to 131 wherein the particles comprise polypeptides.

139. A method according to any one of claims 113 to 131 wherein the particles comprise aggregations of molecules.

140. A method according to claim 139 wherein the aggregations comprise micelles.

141. Apparatus for concentrating particles, the apparatus comprising:

a body of a medium in which the particles are mobile;

a first field source coupled to deliver a time-varying driving field to the medium the driving field capable of applying a time-varying driving force alternating in direction to particles in the medium; and,

a second field source coupled to deliver a time-varying mobility-varying field to the medium, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field; and,

a control system configured to apply the driving field and mobility-varying field simultaneously to at least a portion of the medium during a period.

142. Apparatus according to claim 141 wherein the body of the medium comprises a thin layer.

143. Apparatus according to claim 141 comprising an extended electrode maintained at a substantially constant potential on either side of the thin layer.

144. Apparatus according to any one of claims 141 to 143 wherein the medium comprises a gel.

145. Apparatus according to claim 144 wherein the gel comprises an agarose gel.

146. Apparatus according to any one of claims 141 to 145 wherein the medium comprises binding sites that selectively bind to the particles.

147. Apparatus according to claim 146 wherein the selective binding sites comprise sequences of nucleic acids that are complementary to nucleic acid sequences occurring in the particles.

148. Apparatus according to any one of claims 141 to 147 wherein the first field source comprises three or more non-collinear electrodes and a power supply controlled by the control system to apply a sequence of voltage patterns to the electrodes.

149. Apparatus according to any one of claims 141 to 148 wherein the second field source comprises a heater connected to vary a temperature of the medium in time with a time-variation of the driving force.

150. Apparatus according to any one of claims 141 to 148 wherein the second field source comprises a source of a magnetic field.

151. Apparatus according to any one of claims 141 to 148 wherein the second field source comprises a source of electromagnetic radiation.

152. Apparatus according to claim 151 wherein the source of electromagnetic radiation comprises a source of light.

153. Apparatus according to claim 152 wherein the source of light is configured to illuminate the medium with a pattern of alternating lighter and darker areas.

154. Apparatus according to claim 153 wherein the source of light comprises a mask defining the alternating light and dark areas.

155. Apparatus according to claim 152 wherein the pattern constitutes a first pattern and the source of light is configured to switch between illuminating the medium with the first pattern and illuminating the medium with a second pattern that is a negative of the first pattern.

156. Apparatus according to claim 155 comprising first and second masks wherein the light source is configured to generate the first pattern by illuminating the medium through the first mask and the light source is configured to generate the second pattern by illuminating the medium through the second mask.

157. Apparatus according to claim 155 wherein the light source is configured to switch between illuminating the medium between third and fourth patterns in addition to the first and second patterns, wherein the third pattern comprises alternating lighter and darker areas having boundaries that intersect boundaries between the light and dark areas of the first mask and the fourth pattern is a negative of the third pattern.

158. Apparatus according to claim 157 wherein the first, second, third and fourth patterns each comprise a plurality of parallel-sided alternating darker and lighter strips.

159. Apparatus according to claim 158 wherein the strips of the third and fourth patterns are oriented at substantially right angles to the strips of the first and second patterns.

160. Apparatus according to any one of claims 157 to 159 comprising third and fourth masks wherein the light source is configured to generate the third pattern by illuminating the medium through the third mask and the light source is configured to generate the fourth pattern by illuminating the medium through the fourth mask.

161. Apparatus according to claim 152 wherein the source of light comprises a plurality of light sources and the apparatus comprises a circuit connected to drive the light sources to produce selected patterns of light on the medium.

162. Apparatus according to any one of claims 141 to 148 wherein the second field source comprises a source of an acoustic field.

163. Apparatus according to any one of claims 141 to 148 wherein the second field source comprises a reservoir of a solvent and a means for applying the solvent to the medium in a time-varying manner.

164. Apparatus according to claim 163 wherein the medium is enclosed in a chamber and the apparatus comprises a means for reducing a pressure within the chamber.

165. Apparatus according to any one of claims 141 to 164 comprising a cooler in thermal contact with the medium.

166. Apparatus according to claim 150 wherein the medium comprises magnetic beads bound to large molecules.

167. Apparatus according to claim 150 wherein the medium comprises magnetic beads bound to molecules of a polymer.

168. Apparatus for concentrating particles, the apparatus comprising:

a body of a medium in which the particles are mobile with a mobility that is a function of electric field intensity;

three or more non-collinear electrodes in electrical contact with the medium;

a control system connected to vary voltages applied to the electrodes over time to apply to the medium a first electric field having an alternating

component directed in a first direction and a second electric field having an alternating component transverse to the first direction.

169. Apparatus according to claim 168 wherein the first electric field alternates in direction at a first frequency and the second electric field alternates in direction with a second frequency; wherein the first frequency is twice the second frequency.

170. Apparatus according to claim 168 wherein the first electric field alternates in direction at a first frequency and the second electric field alternates in direction with a second frequency; wherein the second frequency is twice the first frequency.

171. Apparatus according to any one of claims 168 to 170 wherein the control system is configured to apply voltages to the electrodes such that a sum of the first and second electric fields has a first component that approximates a dipole field within an area of the medium and a second component that approximates a quadrupole field in the area of the medium.

172. Apparatus according to claim 171 wherein the controller is configured to cause the first component to vary in time in a manner that constitutes rotations of the first and second components about a location in the area of the medium.

173. Apparatus according to claim 172 wherein the time variation of the first component is characterized by a first angular frequency and the time variation of the second component is characterized by a second angular frequency that is twice the first angular frequency.

174. Apparatus according to any one of claims 168 to 173 wherein the medium is disposed in a thin layer.

175. Apparatus according to claim 174 comprising an extended electrode maintained at a substantially constant potential on either side of the thin layer.

176. Apparatus according to any one of claims 168 to 175 wherein the body of the medium comprises a flat thin layer and the electrodes are disposed substantially in a plane of the thin layer.

177. Apparatus according to any one of claims 168 to 176 wherein the medium comprises a gel and the electrodes are disposed in an electrically-conductive buffer solution that is in contact with the gel.

178. Apparatus according to any one of claims 168 to 176 wherein the medium comprises a gel.

179. Apparatus according to claim 178 wherein the gel comprises an agarose gel.

180. Apparatus according to any one of claims 168 to 179 wherein the medium comprises binding sites that selectively bind to the particles.

181. Apparatus according to claim 180 wherein the selective binding sites comprise sequences of nucleic acids that are complementary to nucleic acid sequences occurring in the particles.

182. Apparatus for causing motion of particles in a medium, the apparatus comprising:

a first means for applying a time-varying driving field to the particles, the driving field applying a time-varying driving force alternating in direction to the particles; and,

a second means for applying a mobility-varying field to the particles, the mobility-varying field being one or both of: different in type from the driving field, and non-aligned with the driving field;

a means for operating the first and second means in a coordinated manner so that the driving field and mobility-varying field are applied simultaneously during a period and the mobility-varying field causes a mobility of the particles in the medium to be time dependent during the period, in a manner having a non-zero correlation with the driving field over the period.

183. Apparatus comprising any new useful and inventive feature, combination of features and/or means, sub-combination of features and/or means described herein.

184. Methods comprising any new useful and inventive step, act, combination of steps and/or acts or sub-combination of steps and/or acts described herein.